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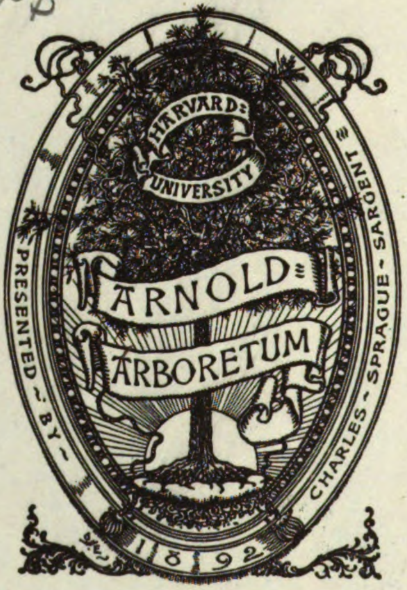

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always found associated with the dead fish. Members of the Diptera, Coleoptera, Lepidoptera, and Hymenoptera have been observed in this association. The first two orders named are by far the most abundant, both in number of species and individuals. Of these the Diptera usually far outnumber the Coleptera in number of individuals, the only four species*, ***Lucilia caesar*** Linne, ***Compsomyia macellaria*** Fabr.; ***Sarcophaga sarraceniae*** Riley, and ***Sarcophaga assidua*** Walker, all members of the family Sarcophagidæ, are at all common. Diptera are universally present in the larval stage and usually in large number while with few exceptions, as mentioned, later, the Coleoptera found associated with the dead fish are in the adult stage. This makes the Diptera of first importance in removing the frequent accumulation of fish. Twenty-one species of Coleoptera in all, as follows, were found by the writer associated with dead fish and apparently feeding thereon:

Silphidæ

Necrophorus americanus Oliv.
Necrophorus orbicollis Say.
Necrophorus tomentosus Weber
Silpha surinamensis Fab.
Silpha inæqualis Fab.
Silpha americana Linn.

Staphylinidæ

Leistotrophus cingulatus Grav.
Creophilus villosus Grav.
Philonthus aeneus Rossi.

Dermestidæ

Dermestes caninus Germ.
Dermestes vulpinus Fab.

Histeridæ

Hister imunis E.
Hister abbreviatus Fab.
Saprinus lugens Erichs.
Saprinus pennsylvanicus Payls.
Saprinus assimilis Payls.
Saprinus fraternus Say.
Saprinus patruelis Lec.

Mitidulidæ

Omosita colon Linn.

Scarabæidæ

Onthophagus hecate Panz.
Trox scabrosus Beauv.

It was thought that the Coleopterous scavangers might be most active at night while retiring to more secluded hiding places by day. This was disproven by night trips with lantern, when Coleoptera were found in no greater numbers than by day, except Trox scabrosus Beauv. This last named species was usually found in large numbers clumsily wading thru the sand, and leaving their paths as irregular lines running in every direction. When approached they play "possum" and easily pass for pebbles. Their frequency at fish by night, however, did not show a marked increase over that of the day.

One or more of the larval forms of this species may be found in their burrows in the sand a few inches under many of the fish, and are sometimes found under boards on the fish strewn beach. None were observed feeding, however, either by night or day.

Early in the period of observation it was found that fish removed from the beach to shaded places under the trees drew coleoptera in much larger number and representing more species, than fish remaining on the beach. For a period of six weeks a number of "traps" made by covering several fish with boards were maintained at different places on the Point, and kept in continual operation by frequently adding fresh supplies of fish. Other traps similar in structure were moved from place to place every few days. It was found that location had much to do with the number of individuals present, and that the traps maintained in regions of the deepest shade were most productive. Within certain limits the number of individuals and species increased with the age of the trap. In these traps larval forms of the families, Silphidæ, Staphy-linidæ and Dermestidæ were frequent. In the aggregate members of the Histeridæ were represented in larger numbers as adults than any other family, but their larvæ were never present.

During the early morning of July 25th, while making a trip along the beach two carp were found, weighing about two pounds each, not more than fifty feet apart, that had just been cast up by the waves. Over one a box 14"x18" was turned, protecting the fish from the sun and the birds. The afternoon of the 28th the box was removed and the sand for a radius of two feet from the fish and to a depth of about a foot was carefully sifted and the astonishing number of 1310 adult Hister beetles, practically all of them Saprinus pennsylvanicus Payk were taken. Most of these we found a few inches under the fish in the sand made wet with the juices. Accompanying these were nine adult Dermestes caninus Germ. To these might be added the five beetles taken from the stomach of a small toad found under the box buried in the sand. Only one of the five, however, was a fish feeder, it being Saprinus pennsylvanicus. Hundreds of Dipteron larvæ were present, but not the slightest trace of beetle larvæ save one of Trox scabrosus.

The sand around the unprotected fish of some size and kind, already mentioned, was sifted but the result was the same as that found at other unprotected fish examined at different times. Of the beetles found at such times the Histers predominated in numbers with an occasional member of the Staphylinidæ and one or two larval forms of Trox scabrosus. No other larval forms of coleoptera were found, the fly larvæ were always found in large number. The total number of beetles found in these unprotected fish never exceeded 100 and averaged about 50.

Some writers suggest that the Hister beetles instead of being carrion feeders may be predaceous, feeding on the larvæ of flies universally present in carrion. Several experiments in which adult Histers were confined with fly larvæ for several days with and without other food failed to show one case where a fly larva sacrificed its life to the Hister beetles. On July 31st, however, the writer saw two adults of Silpha americana eating fly larvæ about 3 mm. in length. This feeding continued for some time under observation. As they walked about they would pass exposed parts of the fish to eat at piles of larvæ. Two or three larvæ would be taken up at one time and eaten with apparent relish.

By way of comparing fish and other carrion as food for these forms, the body of a cat was used as bait in a trap. When examined 17 Silpha americana were taken while a few others escaped. In the same morning but two beetles of the same species were found in a trap baited with fish twice as bulky in quantity as the cat and located in adjacent territory.

From these rather rambling observations the following conclusions may be drawn.

1. Coleoptera are of only secondary consideration in reducing the fish debris of Cedar Point.
2. They are most active in damp shaded places and resort to fish of the sun-heated beach only of necessity.
3. While associated with the fish on the beach they are eaten in large quantities by the sand pipers and other shore birds and doubtless must draw new recruits from more protected places to preserve their balance.
4. The larval forms, the Trox excepted, if fish feeding do not appear on the beach during June and July.
5. With a number of these forms fish is not their first choice as food.
6. The Hister beetles on the beach probably feed on neither the flesh of fish nor fly larvæ but on the juices escaping from the decaying fish.

RECORDS OF GUATEMALAN HEMIPTERA-HETEROPTERA WITH DESCRIPTION OF NEW SPECIES.*

HERBERT OSBORN and CARL J. DRAKE.

The Guatemalan Hemiptera-Heteroptera listed and the new species described in this paper were collected by Prof. Jas. S. Hine during the winter of 1905. Altho most of the records recorded herein are found in the "Biologia Centrali Americana" and confirm the records of Messrs. Distant and Champion, several are new to Guatemala and Honduras, some to Central America, and a few to science.

Nearly all of the aquatic and semi-aquatic Heteroptera were turned over to Mr. J. R. de la Torre Bueno who has published a preliminary paper[1] on the same. A paper[2] covering part of the Homoptera was published by the senior author, but some of this material remains in the university collection for further study.

Family CORIXIDÆ.

Tenagobia socialis F. B. White.

One specimen: Los Amates, Guatemala, Feb. 18th, 1905.

Family NEPIDÆ.

Ranatra fusca Palisot de Beauvois.

Two typical specimens, taken at Los Amates, Guatemala, Jan. 16th, 1905.

Family BELOSTOMIDÆ.

Belostoma annulipes Herrich-Schaffer.

One specimen: Los Amates, Guatemala, Jan. 16th, 1905.

Abedus breviceps Stal.

One specimen: Gualan, Guatemala, Jan. 14th, 1905.

Zaitha anura Herrich-Schäffer.

One specimen: Los Amates, Guatemala, Jan. 16th, 1905.

Zaitha fusciventris Dufour.

One specimen: Los Amates, Guatemala. Feb. 16th, 1905.

Family GELASTOCORIDÆ.

Pelogonus perbosci Guerin.

Several specimens from Guatemala: Gualan, Jan. 14th; Los Amates, Feb. 16th; Santa Lucia, Feb. 2d, 1905.

Gelastocoris oculatus Fabricius.

Five specimens of this common and widely distributed species from Guatemala; Gualan, Jan. 14th; Aguas Callientes, Jan. 28, 1905.

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* Contributions from the Department of Zoology and Entomology of the Ohio State University, No. 40.

[1] Ohio Naturalist, Vol. VIII, No. 8, p. 370-382.

[2] Ohio Naturalist, Vol. IX. No. 5, p. 457-466.

Family SALDIDÆ.

Salda opacipennis Champion.

A large series, evidently a common insect in Guatemala: Gualan, Jan. 14th, 1905. The female is larger and broader than the male and has a white spot at the base of the elytra. The genital segment is slightly produced in the middle; whitish on the borders and most of the posterior third.

Family REDUVIIDÆ.

Saica apicalis n. sp.

Similar to *S. fuscipes* Stal, but with the apices of the femora, base of tibiae, and spines on the pronotum, prothorax, and scutellum vermillion-red.

Antennæ as long as the body; basal segment nearly as long as the other three conjoined; second segment one-third as long as the first; third segment twice the length of the second; fourth one-half the length of the third; first and second segments straight; the third and fourth slender and curved. Anterior and intermediate legs nearly equal in length; posterior legs longer with the femora passing the end of the abdomen. Legs and antennæ clothed with long fine hairs. The anterior femora with an outer and inner row of setæ quite regularly placed.

COLOR. Head, thorax, abdomen, rostrum, base of antennæ, coxæ, trochanter, base and apex of femora, costa, veins of hemelytra and base of tibiæ vermillion-red. Antennæ, femora except base and apex, tibiæ except base and apex, posterior portion of abdomen, blackish or infuscated. Legs blackish, apex of tarsi and tibiæ of fore and middle legs fusco-ochraceous. Tarsi only of posterior legs fusco-ochraceous.

♂. Penultimate segment short and surpassed by the margin of the antepenultimate. Terminal segment tumid, with long incurved claspers, densely haired, acute at tip.

♀. Genital segments triangular, rounded below, with a central supra-anal plate covering the larger part. The lateral lobes narrow, their apices and borders of vulvar openings densely haired.

Length ♂ and ♀ 13 to 13.5 mm, width ♂ and ♀ 2 mm.

One ♂ and four ♀, taken at Los Amates, Guatemala, Feb. 18th to 28th, 1908.

?**Stenopoda culiciformis** Fabricius.

One nymph, taken Jan. 15th, 1905 at Gualan, Guatemala.

Conorhinus dimidiatus Latreille.

One specimen, belonging to the variety *C. maculipennis* Stal as recognized by Champion: Santa Lucia, Guatemala, Feb. 1st, 1905.

Sirthenea carinata Fabricius.

One adult and two nymphs from Guatemala: Morales, March 8th; Gualan, Jan. 14, and Feb. 15, 1905. This conspicuous and well-marked species ranges from Ohio to the southern part of South America.

Apiomerus moestus Stal.

One specimen, taken at Puerto Barrios, Guatemala, March 3rd, 1905.

Zelus rubidus Lepelletier et Serville.

One specimen, taken Jan. 14th, 1905 at Gualan, Guatemala.

Zelus cervicalis Stal.

♂ and ♀, taken Jan. 14th, 1905 at Gualan, Guatemala. This seems to be a rather variable insect. In color the ♂ agrees with *Z. lævicollis* Champion but lacks the tooth on the lateral angles of the pronotum. In the ♀ the color markings on the post-ocular portion of the head are not very distinct and there are no spines on the pronotum; the legs are much darker than in the male. A large series of these two forms will probably prove *Z. lævicollis* Champion to be a variety of this species with a slightly prominent tooth on the lateral angles of the pronotum.

Ricolla simillima Stal.

A large series of this common insect from Guatemala: Gualan, Jan. 14th; Los Amates, Jan. 17th and Feb. 18th to 28th; Puerto Barrios, March 3d to 14th. One specimen, taken at San Pedro, Honduras, Feb. 21st, 1905.

Repipta taurus Fabricius.

Five specimens from Guatemala: Gualan, Jan. 14th; Los Amates, Feb. 18th; Puerto Barrios, March 3d, 1905.

Repipta flavicans Amyot and Serville.

Three specimens from Guatemala; Santa Lucia, Feb. 2d; Puerto Barrios, March 3d, 1905. One specimen, collected at San Pedro, Honduras, Feb. 21st, 1905.

Repipta nigronotata Stal.

One specimen, taken March 3d, 1905 at Puerto Barrios, Guatemala.

Atrachelus cinereus Fabricius.

Four specimens from Guatemala: Gualan, Jan. 14; Santa Lucia, Feb. 2d, 1905.

Sinea sp.

One nymph; Los Amates, Guatemala.

Sinea caudata Champion.

One specimen, taken at Los Amates, Guatemala, Feb. 2d, 1905.

Sinea raptoria Stal.

Two specimens, taken at Gualan, Guatemala, Jan. 14, 1905.

Family EMESIDÆ.

Emesa longipes De Geer.

Five specimens from Guatemala: Gualan, Jan. 14th; Mazatenango, Feb. 3d, 1905.

Ghilianella ignorata Dohrn.

One specimen, taken Feb. 5th, 1905 at Los Amates, Guatemala.

Stenolæmus spiniventris Signoret.

One specimen: Los Amates, Guatemala, Jan. 17th, 1905. This species is apparently very rare and, although not hitherto recorded for Guatamala, this confirms the record of its occurrence in Central America.

Family ANTHOCORIDÆ.

Asthenidea nebulosa Uhler.

Two specimens from Guatemala: Los Amates, Feb. 25th, 1905.

Family CAPSIDÆ.

Trachelomiris oleosus Distant.

A large series of this common insect. Guatemala: Santa Lucia, Feb. 2d; Mazatenango, Feb. 3rd; Gualan, Feb. 13th; Los Amates, Feb. 18th and March 18th to 28th; Puerto Barrios, March 3d, 1905. Honduras: Feb. 21st to March 8th, 1905.

Jobertus chryselectrus Distant.

Two specimens from Guatemala: Santa Lucia, Feb. 2d; Los Amates, Feb. 25th, 1905.

Creontiades rubrinervus Stal.

One specimen from Guatemala: Santa Lucia, Feb. 2d, 1905.

Eioneus bilineatus Distant.

One specimen, taken at Los Amates, Guatemala, Jan. 17th, 1905.

Resthenia latipennis Stal.

A fine series from Guatemala: Gualan, Jan. 14th; Santa Lucia, Feb. 2d, 1905. One specimen from Honduras; San Pedro, Feb. 21st, 1905. The series contains the typical and varietal forms as figured by Distant, also specimens with the pale coloration being more ochraceous than red. The different color patterns gradually merge into each other.

Resthenia vitticeps Stal.

One specimen, taken March 3d, 1905 at Puerto Barrios, Guatemala.

Resthenia persignanda Distant.

Nine specimens from Guatemala: Santa Lucia, Feb. 2d, 1905.

Compsocerocoris annulicornis Reuter.

Three specimens of this very variable species. Guatemala; Los Amates, Feb. 25th, 1905. Honduras; Feb. 21st, 1905.

Neurocolpus mexicanus Distant.

One specimen, taken at Gualan, Guatemala, Jan. 14th, 1905.

Pappus breviceps n. sp.

Approaching *P. sordidus* Distant, but with the third and fourth antennal segments very short. Length 4.5 mm. Width 1.25 mm.

Head short, deflected; tylus prominent, polished black; eyes prominent. Pronotum slightly constricted in front of the middle; with two elevated lobes anteriorly, scarcely punctured; posterior portion coarsely punctate. Scutellum minutely transversely rugulose-punctate. The clavus and corium coarsely punctate. Posterior part of pronotum, scutellum, and hemelytra with sparse, minute, decumbent hairs. Antennæ with the first segment enlarging at the apex, scarcely longer than the head; second segment moderately thick, slender at base, and slightly incrassated towards apex, distinctly pilose, and three times as long as the first; third segment enlarging at the apex, much shorter than the first; fourth segment inflated, subequal to the third in length.

COLOR. Antennæ, eyes, and spot on the meta- and mesopleura black. Head, pronotum, and corium ochraceous and shaded with fuscous. The front of the head with about six transverse reddish arcs. Prothorax with a transverse band before the middle, in the depression reddish-fuscous; a submarginal band at base and extending forward on the sides fuscous. Scutellum blackish at the sides, with a central obscure ochraceous stripe. Membrane fuscous. Legs yellow; femora with a reddish-fuscous band near the apex; an indistinct band beyond the middle of the tibiæ and the tarsi fuscous.

Described from a single example, taken at Los Amates, Guatemala, Feb. 18th, 1905.

This species seems to be included in the genus *Pappus* as described by Distant, but differs somewhat in the proportional length of the antennal segments and in the shorter and more rounded front of the head.

Garganus albidivittis Stal.

A large series from Guatemala: Santa Lucia, Feb. 2d; Mazatenango, Feb. 3d; Los Amates, Feb. 18th to 28th. Honduras; San Pedro, Feb. 21st, 1905.

Genus **Isoproba** gen. nov.

Head globose and connected to the prothorax by a narrow neck; face strongly deflected. Antennæ slightly setose; first segment shorter than the head (about two-thirds as long); second segment slightly thickened, four times as long as the first, or about equal to the third and fourth conjoined. Rostrum reaching the intermediate coxæ. Prothorax narrowed in front and flaring behind; the posterior border concave; dorsal surface gibbous in front and with transverse depression behind the middle. The base of the scutellum tumid. Elytra semitransparent and set with short hairs. Type of genus—*Isoproba picea.*

This genus can be separated readily from *Paraproba* Distant and allied genera by the more globose head and the peculiar shape of the prothorax.

Isoproba picea n. sp.

Head globose, slightly wider than long. Eyes not prominent, forming part of the contour of the head; tylus slightly projecting, but strongly deflected. Antennæ with the first segment short, slender at base; second segment enlarging slightly towards the apex; third and fourth segments slender.

COLOR. General color jet black; elytra and legs pallid. Head, second segment of antennæ, thorax, scutellum, and abdomen beneath shining pitchy black. First segment of antennæ pallid, except at base black; second, third, and fourth segments black. Elytra semitransparent, on the inner border of the corium and clavus pallid and infuscated; the apex of corium and clavus, the margin of the cuneus, and the membrane faintly smoky. The legs pallid. Length, 2.75 mm, width .34 mm.

One specimen, taken at Puerto Barrios, Guatemala, March 3d, 1905.

Lygus pratensis Linnaeus.

Two specimens of this widely-distributed and very variable species from Guatemala: Santa Lucia, Feb. 2d, 1905.

Lygus sallaei Stal.

Three specimens from Guatemala: Los Amates, Santa Lucia, Feb. 2d; Gualan, Feb. 14, 1905.

Lygus scutellatus Distant.

A good series from Guatemala: Los Amates, Jan. 17th, and Feb. 25th; Santa Lucia, Feb. 2d; Puerto Barrios, March 3d, 1905.

Lygus lanuginosus Distant.

Five specimens from Guatemala: Los Amates, Santa Lucia, Feb. 2d, 1905.

Lygus cuneatus Distant.

A good series from Guatemala; Los Amates, Jan. 17th; and Feb. 25th; Santa Lucia, Feb. 2d; Puerto Barrios, March 3d, 1905.

Poecilocapsus ornatulus Stal.

One specimen, taken Feb. 3d, 1905 at Mazatenango, Guatemala.

Horcias plausus Distant.

Four specimens from Guatemala: Los Amates, Jan. 17th and Feb. 25, 1905.

Eccritotarsus pallidirostris Stal.

A large series from Guatemala: Santa Lucia, Feb. 2d, 1905.

Eccritotarsus incurvus Distant.

One specimen, taken at Los Amates, Guatemala, Jan. 17th, 1905.

Eccritotarsus bulbosus n. sp.

Near *E. incurvus* Distant, but differing by its smaller size and the two conspicuous inflated bulbous enlargments on the pronotum. Antennæ, legs, membrane, and two spots on the margin of the corium white. Length 2.5 mm. width .9 mm.

Head transverse; eyes prominent; face deflected. Antennæ with the first segment longer than the head and slightly shorter than the second; third and fourth segments absent. Pronotum elevated in two conspicuous bulbous enlargments equal to the depth of the body, separated by a deep central furrow, leaving a narrow collar in front, and slightly overhanging the scutellum behind. Head and pronotum roughly punctate. Elytra with the costal margins convex, whitish, semitransparent, and with a black spot behind the middle and another near the apex; cuneus transparent; narrow borders of cuneous and cell of membrane dusky. Legs distinctly whitish; tarsi and claws dusky. Genital segments whitish.

Three examples from Guatemala: Gualan, Jan. 14th, 1905; Santa Lucia, Feb. 2d, 1905.

Eccritotarsus atratus Distant.

A good series from Guatemala: Gualan, Jan. 14th; Santa Lucia, Feb. 2d; Los Amates, Feb. 18th to 28th, 1905.

Eccritotarsus nocturnus Distant.

Two specimens, taken at Gualan, Guatemala, Jan. 14th, 1905.

Eccritotarsus procurrens Distant.

A large series from Guatemala: Gualan, Jan. 14th; Los Amates, Jan. 17th, and Feb. 25th; Santa Lucia, Feb. 2d; Puerto Barrios, March 3d, 1905.

Annona bimaculata Distant.

A large series from Guatemala; Los Amates, Jan. 17th, Feb. 18th to 28th; Santa Lucia, Feb. 2d, 1905.

Annona decoloris Distant.

One specimen, taken at Santa Lucia, Guatemala, Feb. 2d, 1905.

Neofurius tabascœnsis Distant.

One specimen, taken at Mazatenango, Guatemala, Feb. 3d, 1905.

Bibaculus modestus Distant.

Eight specimens from Guatemala: Santa Lucia, Feb. 2d; Puerto Barrios, March 3d, 1905. As noted by Distant, this is a variable species. Three specimens are typical *modestus;* the others have the black markings brownish and more or less indistinct.

Neosilia pulchra Distant.

One specimen, taken Feb. 2d, 1905 at Santa Lucia, Guatemala.

Neosilia viduata Distant.

A good series from Guatemala; Los Amates, Jan. 17th and Feb. 18th to 28th, 1905.

Jornandes parvus Distant.

Two specimens from Guatemala: Los Amates, Feb. 18th and 25th, 1905. The two examples differ from Distant's description in having the outer half of the first antennal segment swollen and black.

Lampethusa anatina Distant.

A large series of this variable species from Guatemala: Los Amates, Jan. 17th and Feb. 25th; Santa Lucia, Feb. 2d; Mazatenango, Feb. 3d; Puerto Barrios, March 3d, 1905. One specimen from Honduras; Feb. 21st, 1905.

Family PHYMATIDÆ.

Macrocephalus notatus Westwood.

Six specimens from Guatemala: Puerto Barrios, March 3d, 1905.

Phymata erosa Linnæus.

One specimen, belonging to the variety *fasciata* Gray, from Guatemala: Gualan, Jan. 14th, 1905.

Family ARADIDÆ.

Hesus flaviventris Burmeister.

One specimen, taken March 3d, 1905 at Puerto Barrios, Guatemala.

Dysodius lunatus Fabricius.

Two specimens from Guatemala: Puerto Barrios, March 3d; Morales, March 8th, 1905.

Family TINGITIDÆ.

Gargaphia nigrinervis Stal.

Two specimens from Guatemala: Gualan, Jan. 14th, 1905.

Leptostyla lineata Champion.

One example from Guatemala: Los Amates, Feb. 18th, 1905.

Teleonemia atratra Champion.

One ♂, Los Amates, Guatemala, Jan. 17th, 1905.

Atheas nigricornis Champion.

Five specimens from Guatemala: Gualan, Jan. 14th, 1905.

Acanthochila armigera Stal.

One specimen, taken at Los Amates, Guatemala, Feb. 18th, 1905.

Monanthia monotropidia Stal.

One example from Guatemala: Los Amates, Feb. 18th, 1905.

Family LYGÆIDÆ.

Oncopeltus cingulifer Stal.

Five specimens from Guatemala: Gualan, Jan. 14th; Los Amates, Feb. 18th to 28th, 1905. Two examples from Honduras; San Pedro, Feb. 21st to 28th, 1905.

Lygæus pyrrhopterus Stal.

One specimen, taken March 8th, 1905, at Panzos, Guatemala.

Nysius spurcus Stal.

A good series from Guatemala: Gualan, Jan. 14th; Los Amates, Jan. 17 and Feb. 18th to 28th, 1905.

Ninus notabilis Champion.

Two specimens from Guatemala: Gualan, Jan. 14th; Puerto Barrios, March 3d, 1905.

Ischnodemus præcultus Distant.

One specimen, taken at Puerto Barrios, Guatemala, March 3d, 1905.

Ischnodemus cahabonensis Distant.

Three specimens from Guatemala: Los Amates, Jan. 17th; Santa Lucia, Feb. 2d, 1905.

Blissus leucopterus Say.

One example, taken at Los Amates, Guatemala.

Geocoris lividipennis Stal.

One specimen, taken at Gualan, Guatemala, Jan. 1st, 1905.

Geocoris punctipes Say.

One specimen from Guatemala: Los Amates, Feb. 25th, 1905.

Pachygrontha compacta Distant.

One specimen, taken March 3d, 1905, at Puerto Barrios, Guatemala.

Davila concavus Distant.

Two specimens from Guatemala: Santa Lucia, Feb. 2d, 1905.

Myodocha unispinosa Stal.

Three specimens from Guatemala: Gualan, Feb. 15th and 19th; Los Amates, Feb. 25th, 1905.

Heræus cincticornis Stal.

One specimen, taken at Los Amates, Guatemala.

Pamera parvula Dall.

Ten specimens from Guatemala: Gualan, Jan. 14th; Los Amates, Feb. 16th to 28th; Puerto Barrios, March 3d, 1905.

Pamera vicinalis Distant.

Three specimens from Guatemala: Los Amates; Gualan, Jan. 14th and Feb. 13th, 1905.

Pamera bilobata Say.

Four specimens from Guatemala: Gualan, Jan. 14th; Los Amates, Feb. 18th to 28th, 1905.

Pamera dallasi Distant.

One specimen, taken at Puerto Barrios, Guatemala, March 3d, 1905.

Pamera globiceps Stal.

Two examples, taken Feb. 2d, 1905 at Santa Lucia, Guatemala.

Gonatus divergens Distant.

Two specimens from Guatemala: Gualan, Feb. 14th; Los Amates, Feb. 18th, 1905. The ♀ specimen is apparently immature and of a light color probably due to the fact that it was killed soon after the last ecdysis took place.

The ♂ referred with some doubt to this species is smaller than indicated by Distant's description. With the material on hand, we do not feel warranted in making a new species of this specimen. It is of a uniformly brown color with the posterior angles of the pronotum and the veins of the corium of lighter brown. Head slightly wider than long; eyes rather coarsely granulate. Antennæ with the second segment one-third longer than the third; third segment slightly longer than first; fourth wanting. Pronotum much wider than long; sides with a simple carina; anteriorly suddenly contracted to width of head; posterior border slightly emarginate. Scutellum triangular, large, elevated next to the pronotum, flattened on the disc, obsoletely carinate at the apex. Head finely punctulate except at the base. Pronotum more coarsely punctulate, but with polished and faintly punctate areas on the anterior disc and the posterior angles. Scutellum, except the polished base, and hemelytra uniformly punctate. Length 4 mm., width 1.75 mm.

Family PYRRHOCORIDÆ.

Dysdercus mimus Say.

Two specimens from Honduras: San Pedro, Feb. 21st to March 8th, 1905.

Dysdercus albidiventris Stal.

A common and very variable insect in Guatemala: Gualan, Jan. 14th; Los Amates, Feb. 18th to 25th, 1905.

Family COREIDÆ.

Pachylis sp.

Five nymphs from Guatemala: Gualan, Jan. 14th; Puerto Barrios, March 3d, 1905.

Stenoscelidea ænescens Stal.

One specimen, taken at Los Amates, Guatemala, Jan. 16th, 1905.

Capaneus odiosus Stal.

Four specimens from Guatemala: Mazatenango, Feb. 3d; Puerto Barrios, March 3d, 1905.

Plapigus circumcinctus Stal.

Three specimens from Guatemala: Los Amates, Jan. 17th; Puerto Barrios, March 3d, 1905.

Madura perfida Stal.

Two specimens from Guatemala: Los Amates, Feb. 18th, 1905.

Madura longicornis Stal.

One example, taken March 3d, 1905 at Puerto Barrios, Guatemala.

Zicca commaculata Distant.

A good series from Guatemala: Los Amates, Jan. 17th, and Feb. 18th to 28th, 1905. Two specimens from Honduras: San Pedro, Feb. 21st, 1905.

Zicca taeniola Dall.

A large series from Guatemala, evidently a common insect. Los Amates, Jan. 17th and Feb. 18th to 28th; Puerto Barrios, March 3d, 1905. Honduras; March 21st, 1905.

Hypselonotus concinnus Dallas.

One specimen, taken at Puerto Barrios, Guatemala, March 3d, 1905.

Savius dilectus Stal.

One specimen from Guatemala: Feb. 18th, 1905.

Hyalymenus pulcher Stal.

Four specimens from Guatemala: Los Amates, Feb. 25th; Puerto Barrios, March 3d, 1905.

Hyalymenus tarsatus Fabricius.

One specimen, taken March 3d, 1905 at Puerto Barrios, Guatemala.

Alydus pallescens Stal.

One specimen from Guatemala: Gualan, Feb. 13th, 1905.

Cydamus borealis Distant.

One example, taken at Los Amates, Guatemala, Jan. 1st, 1905.

Leptocorisa filiformis Fabricius.

Numerous specimens from Guatemala: Santa Lucia, Feb. 2d; Mazatenango, Feb. 3d; Puerto Barrios, March 3d, 1905.

Corizus sidæ Fabricius.

A fine series from Guatemala: Gualan, Feb. 13th; Los Amates, Feb. 21st to March 8th, 1905. Honduras: San Pedro, Feb. 21st to March 8th, 1905.

Family BERYTIDÆ.

Jalysus mollistus Distant.

Four specimens from Guatemala: Santa Lucia, Feb. 2d, 1905.

Family PENTATOMIDÆ.

Podisus thetis Stal.

Two specimens: Los Amates, Guatemala, Feb. 21st, 1905; San Pedro, Honduras, Feb. 25th, 1905.

Mormidea ypsilon Linnæus.

Several specimens from Guatemala: Los Amates, Jan. 17th and Feb. 18th to 28th; Gualan, Jan. 14th; Puerto Barrios, March

3d, 1905. The specimens all belong to the variety *M. inermis* Dall. as recognized by Distant. A large series of this species from British Guiana shows about every gradation from the strongly spinous to the non-spinous pronotal angles.

Mormidea pictiventris Stal.
A fine series from Guatemala: Puerto Barrios, March 3d, 1905.

Euschistus crenator Fabricius.
A full series, evidently rather abundant in Central America. Guatemala: Gualan, Feb. 15th; Los Amates, Feb. 25th; Puerto Barrios, March 3d and 14th, 1905. Honduras: San Pedro, Feb. 21st to March 8th, 1905. This is a rather variable species. Three specimens from Gualan have the humeral angles less produced and not acutely angled; the lateral border of pronotum denticulate anteriorly, smooth posteriorly (without any denticulations); scutellum at apex with a very narrow whitish border.

Proxys albo-punctulatus Palisot de Beauvois.
Two specimens: Santa Lucia, Guatemala, Feb. 2d, 1905.

Proxys victor Fabricius.
Four specimens from Guatemala: Santa Lucia, Feb. 2d, and Los Amates; Feb. 18th and 25th, 1905.

Proxys punctulatus Palisot de Beauvois.
Two specimens: San Pedro, Honduras, Feb. 21st, 1905. The three above species belonging to this genus are closely related. The rather arbitrary separation on color of legs seems barely warranted, but we have followed Stal and Distant in recognizing them.

Thyanta perditor Fabricius.
Three specimens from Guatemala: Gualan, Jan. 14th, Los Amates; Feb. 18th, and Puerto Barrios, March 3d, 1905.

Nezara marginata Palisot de Beauvois.
Two specimens: Los Amates, Guatemala, Jan. 16th, 1905.

Banasa albo-apicata Stal.
One specimen: Los Amates, Guatemala, Feb. 18th, 1905. Hitherto recorded for Central America (Honduras) on the authority of Stal and its occurrence seems rather rare.

Piezosternum subulatum Thumb.
One specimen, taken at Morales, Guatemala, March 8th, 1905. This species has been recorded for Panama, Columbia, and Antilles but not for Guatemala.

Edessa taurina Stal.
One specimen: Puerto Barrios, Guatemala, March 3d, 1905.

Edessa affinis Stal.

Eight specimens: Puerto Barrios, Guatemala, March 3d, 1905.

Edessa rixosa Stal.

Two specimens from Guatemala: Los Amates; Feb. 25th and Morales; March 8th, 1905.

Edessa rufomarginata DeGeer.

A common species for a large area in Central and South America. Guatemala: Los Amates, Feb. 18th; Puerto Barrios, March 5th to 11th; Morales, March 8th; Panzos, March 18th, 1905.

Stiretrus anchorago Fabricius.

Two specimens, much smaller than the typical specimens found in United States, but otherwise similar: Puerto Barrios, Guatemala, March 3d, 1905.

Family CYDNIDÆ.

Pangæus piceatus Stal.

One specimen, taken at Gualan, Guatemala, Feb. 15th, 1905.

Family THYREOCORIDÆ.

Thyreocoris guttiger Stal.

Four specimens: Los Amates, Guatemala, Feb. 10th to 18th, 1905. Three specimens seem to be typical *T. guttiger* and the other is intermediate between this species and *T. quadrisignatus* Stal. These two species will probably merge with a more extended series.

VARIATION IN THE SIZE OF RAY PITS OF CONIFERS.*

FOREST B. H. BROWN.

Since Haeckel proposed the word Ecology in 1886, there has been an ever growing interest in the influence which environmental factors may have in determining the form and structure of plants. "Anatomy, particularly stimulated by Haberlandt, has recently been greatly enriched by numerous researches dealing with the question of the harmony between structure and environment."[1] Trees of the same species, but grown under different conditions, will show differences in the structure of their woody tissues that materially affect the durability, strength, and other properties of the wood. In a general way, many of such structural differences have been related to the conditions under which the tree was grown.

To some extent, at least, the physical factors may influence the structure of wood. Cieslar[2] found that certain conifers would form "Rotholz," a tissue of great strength under compression, due to the mechanical influence of a one-sided crown or the weight of a branch. But since one of the main purposes of the woody elements of a tree is to conduct and store the products of assimilation, and to convey the watery solutions, gathered by the roots, to the leaves and other parts where they may be needed, it may be inferred that factors more directly related to the vital processes of the tree will also be more directly related to structural variations.

Of the tissues which go to make up the woody part of the stem of coniferous trees, the medullary ray is one of the most complex, in both its structural and functional aspects. While they make up only 4-8 % of the volume of the wood, their height and width is so small that often over 2,500 rays may be counted in one sq. cm. on the tangential surface (Fig. 1). The average volume of a typical coniferous ray shown in this plate is but one twentieth that of a fine silk thread. None the less, the ray of Picea and Larix, the genera selected for comparison in this paper, is composed of at least two kinds of tissue with an accompanying difference in function (Fig. 2). At the margins are the ray tracheids (r.t.), which communicate with the adjacent wood tracheids by means of bordered pits. "Their purpose is to facilitate the transfer of water radially between the tracheids."[3] Distinguished from the ray tracheids are the ray parenchyma cells with semi-bordered pits (s. b. p.) upon their lateral walls and simple pits upon their end walls (e. w.). These cells make up the storage tissue of the ray, in which the products of assimilation are conducted and stored. Still more complex in structure and function are the rays which have, in addition to the above tissues, a third tissue designed for the secretion, conduction, and storage of resin. A very intimate connection of the rays with the vital activities of the wood may be inferred from the fact that the rays continue living for fifteen years or more, or probably as long as the wood performs

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*Contribution from the Botanical Laboratory of the Ohio State University, No. 90.

1. Warming. 1909. Ecology of Plants, p. 3.
2. Centralblatt f. d. gesamte Forstwesen. Apr., 1896.
3. Strasburger. 1908. Bonn Text-Book, p. 140.

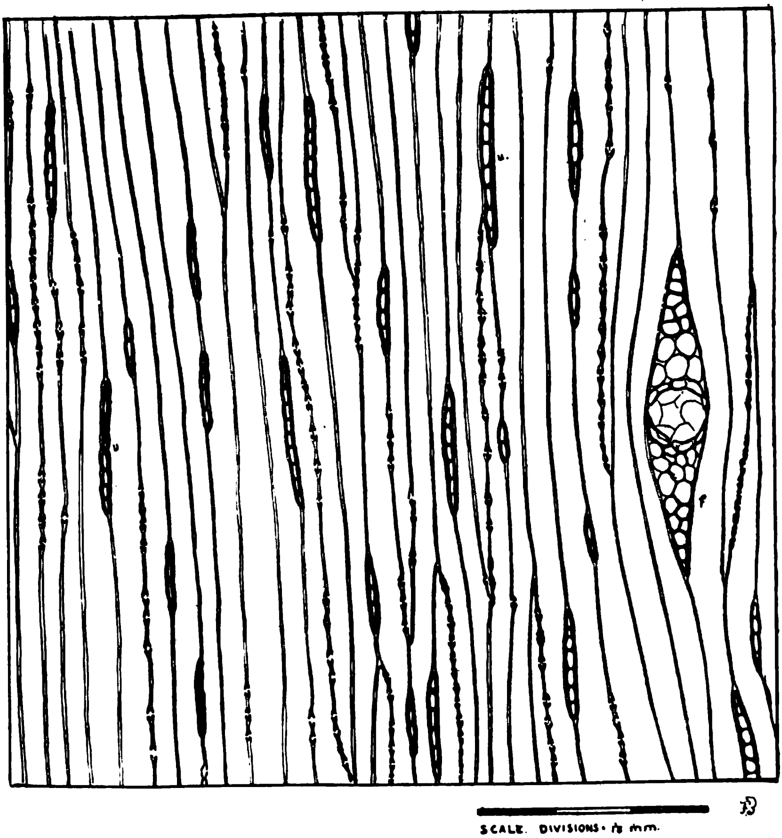

Fig. 1.

Fig. 1. Tangential view Pinus monticola, showing arrangement of the rays with reference to the tracheids.
f. fusiform ray with resin duct. u. uniseriate rays.

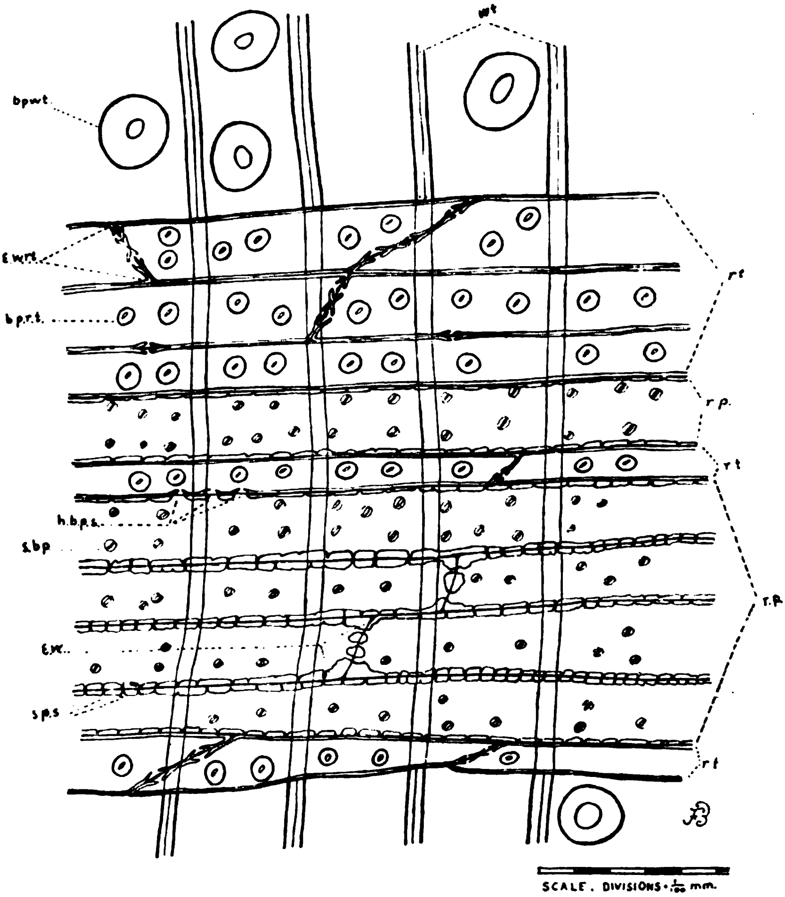

Fig. 2.

Fig. 2. Radial view of Picea canadensis, showing uniseriate medullary ray in section.

r. t.	ray tracheids.
r. p.	ray parenchyma.
w. t.	wood tracheid.
e. w. r. t.	end wall of ray tracheid, showing bordered pits in section.
e. w.	end wall of ray parenchyma cells with simple pits in section.
s. p. s.	simple pits in section.
h. b. p. s.	half bordered pits in section.
b. p. w. t.	bordered pit of wood tracheid.
b. p. r. t.	bordered pit of ray tracheid.
s. b. p.	semi-bordered pit of ray parenchyma.

its physiological functions, and are so disposed that, so far as it has been possible to observe, ***they come in contact with each individual tracheid of the wood.*** It is not uncommon to find tracheids which show four or five points of contact with the ray system. The ray system, is, in turn, through the direct contact of each of its component rays with the cambium and the phloem, in communication with the leaves and all other living structures throughout the tree.

The ray pits formed at the point of contact of the storage cells with the wood tracheids exhibit a number of variations which seem to be related to the life conditions of the species. Unlike the tracheid pits, they differ widely in shape, size, and number for the different genera and species of conifers, affording both generic and specific points of distinction of high taxonomic value. In Larix and Picea, however, these constant characters are similar, especially in P. sitchensis and L. occidentalis, where the ray characters are insufficient to separate the two genera. For this reason, together with the fact that the two genera have widely different habits of nutrition, the two genera have been selected for comparison, since a more direct comparison of the variable characters is possible with woods similar in structure than where the problem would be complicated by structural differences.

In leaf habit, differences are at once apparent that are associated with differences in the storage of reserve and in other processes of nutrition of a fundamental character. The leaves of Larix remain through but one season; being a deciduous conifer, the entire foliage must be regenerated each year. In Picea, the leaves remain for 4-7 years, or the spruce is only ¼ to ⅐ deciduous, and needs to regenerate ¼ or less of its foliage each year. Larix, as with other deciduous trees,[4] is totally dependent upon reserve food for the regeneration of its leaves. Such reserve is stored in the ray system and a heavy demand will therefore be made upon the rays early in the season. Picea, on the other hand, could probably meet this need partly, if not wholly, by the newly formed products of assimilation, since it has been found that first, second, and third year leaves of conifers begin to form starch by the middle of March, even when the temperature often falls below 0° C.[5] Picea, then, should make a relatively slight demand, early in the season, upon the stored reserve.

To determine the relative difference in the amount of starch stored by Larix and Picea, trees of Larix decidua and Picea excelsa ten inches in diameter and growing on the Ohio State University Campus, were felled during winter and the volume of starch contained in the storage tissue of the rays estimated from planimeter measurements of projected drawings. In all cases Picea showed little or no starch in its woody tissues, while Larix contained starch in all of its corresponding living parts. The highest relative amount of starch was found in the dwarf branches where the rays were stored to their full capacity, but varying amounts of starch were found in all other portions where the wood was living. Rays of the sapwood zone, which was fifteen rings in width in the lower portion of the trunk, contained starch throughout the width of the zone. In some portions, 2% of the volume of sapwood was starch, though the rays in this portion of the tree

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[4] Lutz. 1897. Büsgen's Bau und Leben unserer Waldbäume, p. 196.

[5] Mer. 1885. Ueber eine Methode zur Beobachtung der Assimilation. Landwirtschaftl. Jahrb.

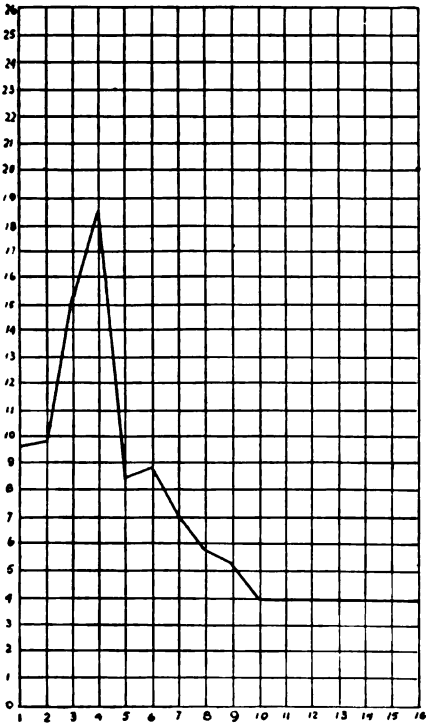

Fig. 3.

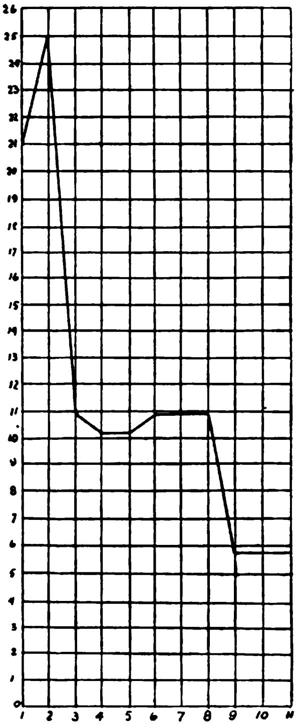

Fig. 4.

Fig. 3. Curve showing variation in size of ray pits of Larix occidentalis, through one annual ring of 16 tracheids, commencing with earliest formed tracheid of spring wood and ending with last formed tracheid of summer wood. Vertical scale, diameters squared.

Fig. 4. Curve showing variation in size of ray pits of Larix laricina, through one annual ring of 11 tracheids, on same scale as Fig. 3.

were not, as a rule, filled to this extent; but, in general, it may be stated that the rays of Larix are, during winter, stored with starch through fifteen years of growth.

Such reserves have been found to be used for two main purposes, the production of leaves and of seed. In rare instances, a portion may be diverted to the growth of wood, but this is not usual. Use of the reserves for seed production will occur, as a rule, at periods of from two to several years; hence annual rigns will occur not subject to any modifications from this source. On the other hand, that used for the regeneration of leaves will be used yearly, and every annual ring will be subject to structural modifications by this factor.

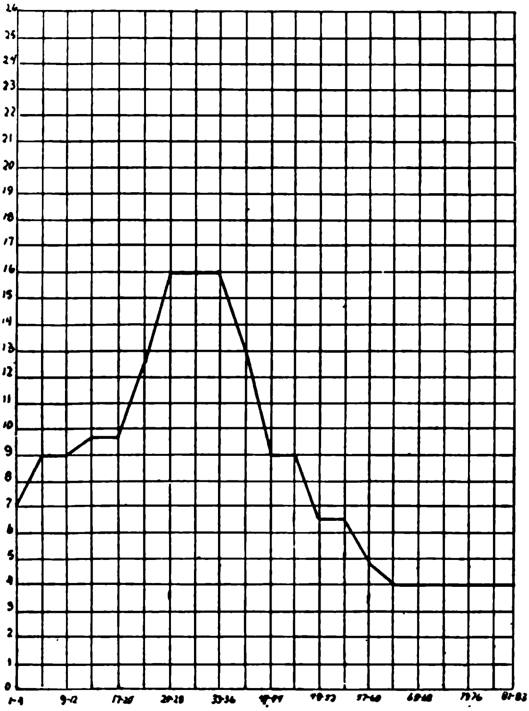

Fig. 5.

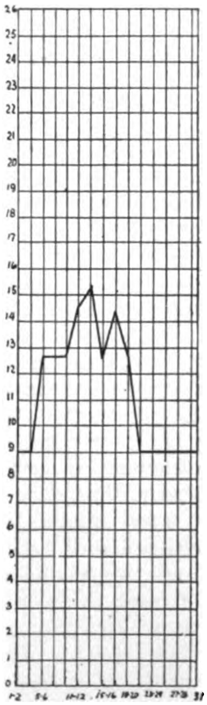

Fig. 6.

Fig. 5. Curve showing variation in size of ray pits of Picea sitchensis, through one annual ring of 83 tracheids, plotted on same scale as Larix, except that the horizontal scale of Larix is four times as great because of the fewer number of tracheids.

Fig. 6. Curve showing variation in size of ray pits of Picea canadensis, through one annual ring of 31 tracheids, on same scale as Fig. 5.

It has been shown that the reserves stored in the rays are forced into the tracheids and are conveyed to the developing new shoots at the beginning of the growing season.[6] The yearly occurrence of this temporary current would be likely to influence the development of the semi-bordered pits through which it passes, providing such pits had not fully completed their development. Since a period of about 90 days is consumed in the development of an annual ring in Picea and Larix,[7] the ray pits of any given ring will be of successively greater age with the youngest at the commencement of the ring, in the earliest spring wood, and differing in age at the extremes by 90 days; hence certain of them, it may be assumed, would still be plastic when this current is formed. By way of confirmation, twigs of L. decidua were sectioned May 20, when leaves had apparently attained their full size. It was found that the sixth tracheid was then being formed, which would bear out the predicted sequence of the maturity of the ray pits, and be in proper position with respect to the greatly diminished current indicated by the fall of the curve. (Figs. 3 and 4).

The curves referred to were obtained from measurements taken of the diameter of the ray pits, commencing with the first spring tracheid and ending with the last summer wood tracheid. Such pits will, then, be arranged in series according to age. For sake of comparison, these measurements are squared, since the efficiency of circular osmotic membranes, other things being constant, should be proportional to such values. The accompanying curves plotted from the results so obtained, show graphically the existence of exactly such a variation in size as would be expected had the above outlined modifying influence of the assimilation current been manifest. As anticipated, both species of Larix show an early and strongly pronounced increase in the size of their ray pits corresponding to the probable time, intensity, and duration of the demand made upon the stored reserve, for the regeneration of leaves. Also, the curves of Picea show the expected absence of the early high point. The problem is here complicated by the presence of currents of newly formed assimilation products commencing in March and increasing with the advance of the season; but, in a general way, the shape of the curve is in accord with the probable influence exerted by[7] the later leaf habit of the genus and the absence of growth conditions that would make the early and brief demand upon the stored reserve noted in Larix. The data thus collected has also demonstrated the intimate connection of the ray with the vital processes of growth and nutrition and the reaction of such processes upon the structure of the ray.

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[6] Fischer, Alfred. 1890. Pringsheim's Jahrbücher, XXII, p. 73.
Strasburger. 1891. Uber den Bau und die Verrichtung der Leitungsbahnen in den Pflanzen, pp. 98, 297.

[7] Hartig, Robert. 1885. Holz der deutschen Nadelwaldbäume.

TABLE I.

Number of tracheid	Number of pits	Average Diameter in microns	Average Diameter squared
1	3	4.6	21.
2	6	5.	25.
3	7	3.3	10.9
4	1	3.2	10.2
5	3	3.2	10.2
6	6	3.3	10.9
7	6	3.3	10.9
8	3	3.3	10.9
9	5	2.4	5.8
10	2	2.4	5.8
11	3	2.4	5.8

Measurement of the ray pits of Larix laricina through one annual ring.

TABLE II.

Number of tracheid	Number of pits	Average Diameter in microns	Average Diameter squared
1	10	3.1	9.6
2	10	3.1	9.6
3	10	3.9	15.2
4	10	4.3	18.5
5	10	2.9	8.4
6	10	3.0	9.0
7	10	2.6	7.0
8	10	2.4	5.8
9	10	2.3	5.3
10	3	2.	4.
11	5	2.	4.
12	4	2.	4.
13	2	2.	4.
14	1	2.	4.
15	1		4.
16			4.

Measurement of ray pits of Larix occidentalis through one annual ring of 16 tracheids; 10-16, late wood; 15-16, so compressed that measurements were approximated.

TABLE III.

Number of tracheid	Number of pits	Average Diameter in microns	Average Diameter squared
1-4	7	2.6	6.8
5-8	12	3.	9.
9-12	13	3.	9.
13-16	11	3.1	9.6
17-20	12	3.1	9.6
21-24	12	3.5	12.3
25-28	12	4.	16.
29-32	12	4.	16.
33-36	10	4.	16.
37-40	12	3.3	10.9
41-44	5	3.	9.
45-48	4	3.	9.
49-52	4	2.5	6.3
53-56	4	2.5	6.3
57-60	4	2.2	4.8
61-64	4	2.	4.
65-68	4	2.	4.
69-72	4	2.	4.
73-76	4	2.	4.
77-80	4	2.	4.
81-83	4	2.	4.

Measurement of ray pits of Picea sitchensis, through one annual ring of 83 tracheids.

TABLE IV.

Number of tracheid	Number of pits	Average Diameter in microns	Average Diameter squared
1-2	5	3.	9.
3-4	5	3.	9.
5-6	6	3.5	12.5
7-8	7	3.5	12.5
9-10	8	3.5	12.5
11-12	7	3.8	14.4
13-14	6	3.9	15.2
15-16	5	3.5	12.3
17-18	7	3.8	14.4
19-20	5	3.5	12.5
21-22	2	3.	9.
23-24	5	3.	9.
25-26	4	3.	9.
27-28	5	3.	9.
29-30	4	3.	9.
31	2	3.	9.

Measurement of ray pits of one annual ring of Picea canadensis with 31 tracheids.

ROOT-KNOT OR EELWORM ATTACKS NEW HOSTS*

LEO E. MELCHERS.

In addition to the hosts known to be attacked by **Heterodera radicicola,** peculiar circumstances recently made it possible for the writer to note and observe its occurrence on seven new and unreported hosts.

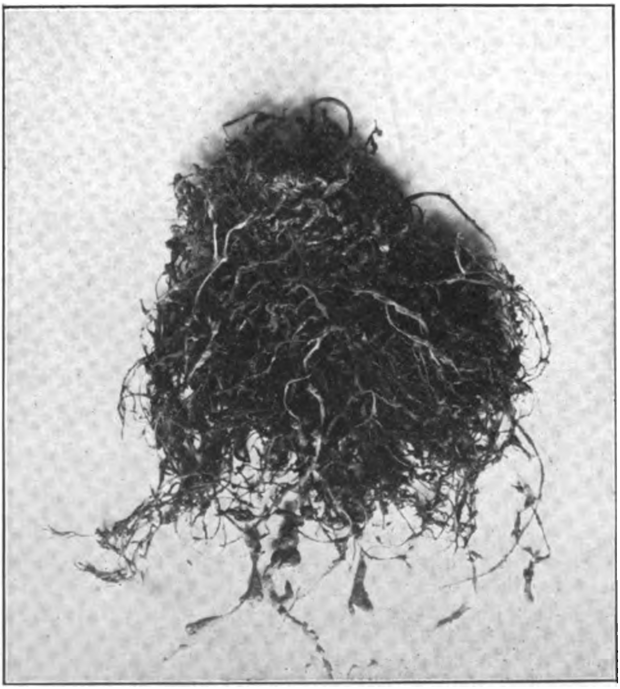

Fig. 1. Root-knot of parsley.
Two-thirds natural size.
Photo by L. E. Melchers.

During December, 1913, the writer noticed the first indications of the root-knot on the tomato crop which was being grown in one of the greenhouses belonging to the Department of Horticulture of the Kansas State Agricultural College. By the end of April the tomato plants were removed on account of their unproductiveness, due to the eelworm infestation. The roots of these plants

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* Kansas State Agricultural College, Manhattan, Kansas.

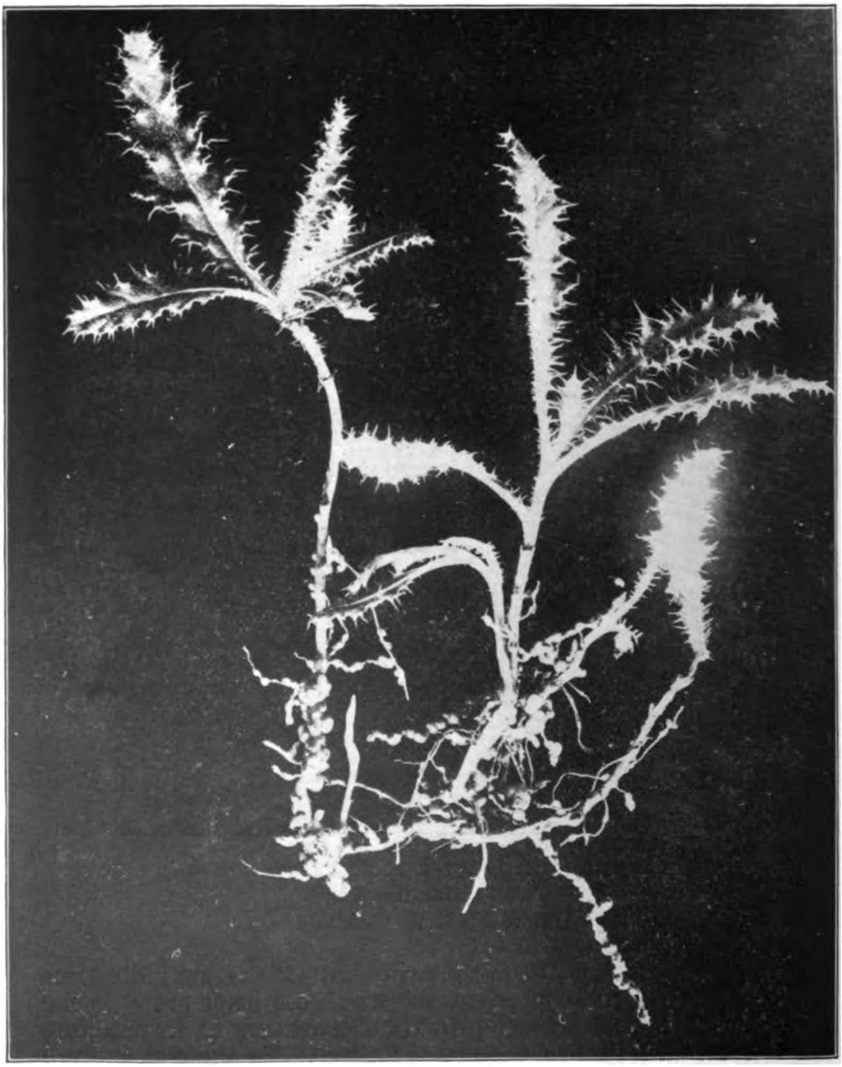

Fig. 2. Root-knot of Canada thistle.
Two-thirds natural size.
Photo by L. E. Melchers.

for the most part had decayed, liberating the eggs and egg-filled bodies of the female nematodes into the soil. The tops of the tomato plants and as many of the remaining roots as could be found, were removed from the bench. The soil itself, however, was not given a soil treatment, but was allowed to remain in an infested state.

The foreman in charge of the greenhouses gave directions to place various potted bedding plants on top of this bench, allowing the pots to come in direct contact with the soil which had previously grown the infested tomato crop. The experiment proved an interesting one, for among the potted plants there were a number which became infested, while, on the other hand, a few kinds which were under the same environmental conditions proved non-susceptible to an attack.

After having stood on top of this bench for more than a month, the following plants showed the development of nodules upon their roots, and upon a microscopic examination revealed the egg-filled nematodes of **Heterodera radicicola: Vinca rosea Linn.** (Madagascar Periwinkle), **Chrysanthemum frutescens Linn.** (Marguerite), **Celosia empress** (Cockscomb), **Matthiola incana Var. annua Voss.** (Ten-weeks or Intermediate stocks), **Zeæ mayz** (Burbank's Rainbow Corn), and **Phlox** (Phlox annual). The writer also reported **Cirsium arvense** (Canada thistle), a susceptible host (Science, 40::241, 1914). There were also a large number of other plants whuch were attacked, but only those which proved to be new hosts have been listed here.

The eelworm has been previously reported as attacking **Zeæ mayz** by Neal, B. P. I. (1889), Burbank's Rainbow corn being a horticultural variety of **Zeæ mayz.**

The following is a list of potted plants which remained apparently unaffected, although they were growing among the infested potted plants: **Centaurea imperialis** (Royal Sweet Sultan), **Calundula** (Pot marigold, Vaughan's Mammoth Mixture and Eldorado), **Salvia zurich** (Dwarf Sage), and **Canna** varieties.

The soil which was used in the bench was originally obtained from a nearby orchard, and was probably infested with **Heterodera radicicola** at the time that it was placed in the greenhouse bench, although it is possible, but not probable, that the organisms gained entrance through the application of infested manure; knowing the source of the fertilizer used, this did not appear to be the case. The soils in many sections of Kansas are badly infested with the eelworm, and the problem of economically combating this pest is becoming a serious problem, especially in the truck-growing regions where entire crops become affected.

Besides the above hosts, the writer obtained specimens of **Carum petroselinum** (parsley) from Hutchinson, Kansas, which were badly affected with the nematode; this is likewise an unreported host. The plants were growing out in the open field at the time the injury was observed. It is not definitely known whether these plants became infected from nematodes which remained alive in the field over winter, or whether contamination resulted otherwise.

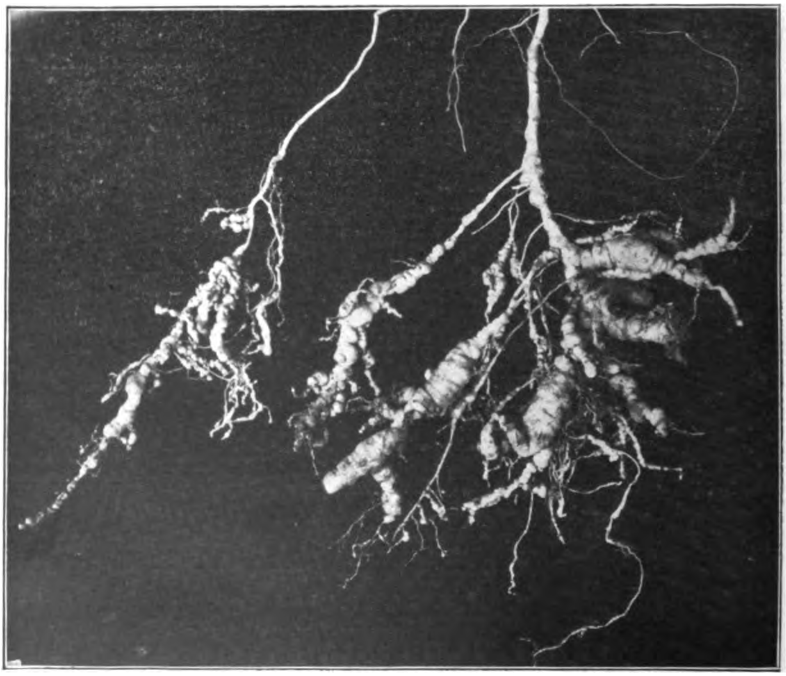

Fig. 3. Root-knot as it occurs on tomato.
Two-thirds natural size.
Photo by L. E. Melchers.

Apparently climatic conditions in this region cannot be too stringently depended upon as a means of control in holding the eelworm in check in the open fields. The winters vary in severity, and are not always severe enough to eradicate the pest in badly infested soils.

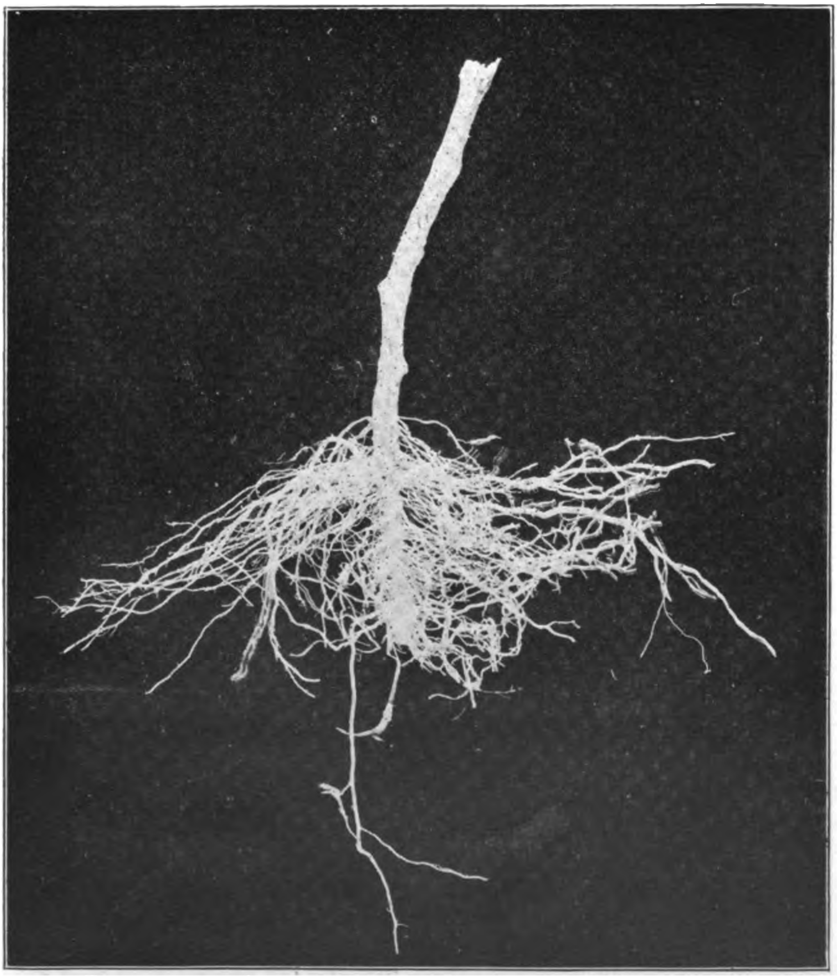

Fig. 4. Normal tomato root for comparison.
Two-thirds natural size.
Photo by L. E. Melchers.

MEETINGS OF THE BIOLOGICAL CLUB.

Botany and Zoology Bldg., Jan 11, 1915.

The meeting was called to order by the President, Dr. Seymour, and the minutes of the previous meeting were read and approved.

Messrs. H. D. Chase, Vernon Haber, R. C. Smith, F. H. Smith, J. R. Smith, W. T. Owry, W. S. Krout, H. J. Reinhard, D. D. Leyda, W. E. Laughlin, C. W. Hauck, John Eckert, Oliver Gossard, J. R. Stear, R. C. Baker, R. A. Knouff, E. H. Baxter, F. F. Searle, Harry Cutler, and Adolph Waller were elected to membership in the club.

The names of Messrs. Joel Foote and A. H. Smith were proposed for membership in the club.

Prof. Osborn gave a brief report of the meeting of the American Association for the Advancement of Science at Philadelphia during the Christmas vacation, and stated that the next meeting of the association would be held at Columbus. He suggested that a committee be appointed by the club to assist the different committees of the University in the preparations for the entertainment of the association. It was moved by Dr. Krecker and seconded by Mr. Kostir "that the President appoint such a committee before the next meeting." The motion was carried.

The program for the evening consisted of many interesting reports from the different members who had attended the meeting at Philadelphia: Professors Schaffner, Griggs, and Stover gave reports from the Botanical sessions; Professors Osborn and Krecker from the Zoological and Entomological sessions; Mr. Weiss from Psychological session; Prof. Prosser from the Paleontological and Geological sessions.

The club then adjourned.

Botany and Zoology Hall, Feb. 8, 1915.

The meeting was called to order by the President, Dr. Seymour, and the minutes of the previous meeting were read and approved. The attendance was unusually large, two hundred and forty-three being present.

Messrs. Joel Foote and A. H. Smith were elected to membership in the club. The names of Messrs. H. C. Yingling, G. S. Zink, and W. D. Will were proposed for membership.

The President appointed Professors T. M. Hills, F. H. Krecker and R. F. Griggs to assist the different committees of the University in the preparations for the entertainment of the American

Association for the Advancement of Science which will meet in Columbus during the next Christmas vacation. It was moved by Prof. Landacre that the President announce the time for the next meeting of the club. The motion was carried. The time for the next meeting was set for the second Monday evening in March.

The program for the evening consisted of a very interesting address on "Evolution and Death" given by Prof. L. B. Walton, of Kenyon College. A brief discussion of the views of Darwin, DeVries, Johannsen, and Lloyd were given. The speaker examined two hundred daisies from a fertile soil, also the same number from poor soil, and the coefficient of variation was found to be the same. Close breeding is more variable than cross breeding and sexes arose as an effort in nature to hold variation in check. Cells are smaller in cross breeding than close breeding; small cells produce faster and, hence, a larger organism. Prof. Walton's hypothesis to account for death was that the cells of an adult organism, being the result of very numerous cell divisions (and hence asexual generations) finally become so highly variable that sooner or later some one or more cells located in a vital part will not be able to subserve their intended function, causing the death of the entire organism. As a working hypothesis, variations were divided into normations and abnormations; the former into fluctuations, amphimutations, and cumulations; the latter into monstrositations, defactorations, and fractionations.

After a discussion of the address, the club adjourned.

BOTANY and ZOOLOGY HALL, March 8, 1915.

The meeting was called to order by the President Dr. Seymour, and the minutes of the previous meeting were read and approved as read. Messrs. H. C. Yingling, W. D. Will, and G. S. Zink were elected to membership.

It was moved by Prof. Hine and seconded that the President appoint a committee of three to consider the advisability of making the Biological Club one of the sections of a Science Club to be formed in the University; also, to consider turning over the Ohio Naturalist and Journal of Science to this Club, providing sufficient financial support be insured for its publication; the name of the Ohio Naturalist and Journal of Science to be changed to the Ohio Journal of Science. The motion was carried. Mr. Shadle called attention to the fact that many of the trees had been removed from the campus during the last few years and only a few had been replanted during this time. It was moved by Mr. Shadle and seconded that a committee of three be appointed by the President to see what could be done towards having more trees replanted on the campus this spring. The motion was carried. Professors Osborn, Prosser, and Durrant were appointed on the first committee and Mr. Shadle, Prof. Lazenby, and Mr. Forest Brown on the latter one.

The program for the evening consisted of two very interesting papers: "The Phylogenetic Relationship of Man and Lower Animals," by Mr. Rollo C. Baker; "The Psychological Relationship of Man and Lower Animals," by Prof. Weiss. Mr. Baker compared the Paleontological, embryological, physiological, and structural development between man and Anthropoid apes. Prof. Weiss compared the actions of lower animals with man. The speech reaction gives man the power to reproduce things of the past and to consider the future, while other animals can adjust themselves only to the present. The speech reaction can be converted into writing and thus man has the traditions and experience of past generations to guide his actions.

After a discussion of the papers, the Club adjourned.

CARL J. DRAKE, *Secretary.*

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